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Recommendations are made that educational media designers be prepared for a career in formal education to the exclusion of other fields currently clamoring for such specialists. The proposed curriculum already suffers from the attempt to include too much content. The curriculum could be adapted to prepare media designers for careers in industry by an internship or thesis in that area as well as the substitution of such courses as business communication, management, and finance for comparable graduate and undergraduate work. Similar substitutions could also be made for students preparing for media design work in medicine, government, or international relations.

Criteria for such substitutions should be that media designers be as knowledeable as possible in the subject to be communicated, the situations in which the communication takes place, and the particular audiences to be reached by the communication. The student's preparation in theory, process and technique could be the same regardless of the particular field.

The cycle of design-test-redesign should characterize both training and practice particularly at the outset. As research and experience accumulate, the initial designs should be more nearly correct and the redesign phase less extensive. As educational system designs are perfected, the design function should give way to a kind of monitoring and occasional modification.

If the present dynamic situation in education continues and if man's knowledge continues to increase at the some accelerated rate, it will be time to begin a new Kindergarten through Grade 12 design as sonn as the previous one has been finished.

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INSTRUCTIONAL TECHNOLOGY - U.S.A.

THE INCLUSION OF WORK IN THE PREPARATION OF A-V MATERIALS IN THE TRAINING OF FUTURE EDUCATIONAL MEDIA OR A-V SPECIALISTS

2447

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The following paper is written in the context of the current revolution in American education generally, and in educational technology particularly. Awareness of this revolution and some of its implications for the Educational Media Specialist is assumed to characterize the readers of this paper, and, hence, the subject will not be dwelt on here. (See report of DAVI Task Force in Audio-Visual Instructor, Jan., 1963.) Rather, the attempt will be to probe more specifically the future role and training of the Educational Media Specialist who would have significant responsibilities in the preparation of production of educational media. The introductory section attempts a quick prognosis of the present producer's situation as a basis for prescribing future changes in the training of his successors.

Many educational media producers today are uncertain as to their present and future roles. They have some reason to be, particularly as their interests and activities may have been focused narrowly on media, technique, and hardware.

For one thing, new technologies have arisen to challenge the expert -- the expert in motion pictures, for example. On the one hand awesome competitors have appeared such as videotape with its mysterious electronics in place of the familiar mechanics and photographics. On the other hand some deceptively simple new competitors have appeared like 8mm cameras with their automatic this-and-that which a child can operate. Thus, the motion picture expert may find he is in trouble because, paradoxically, he both knows too little and knows too much.

Other media experts have their worries as well. For the expert still photographer there is the do-it-yourself Polaroid, for the expert sound recordist there are student-operated language lab consoles, for the graphics expert there is the learn-how-in-two-days seminar given free by enterprising manufacturers of simplified new materials and equipment, and for the expert librarian there is the computer-based system for storage, retrieval, and dissemination of printed matter.

Educational media experts have other challenges today. For example, requests for a set of slides were once simply that they "be about" some subject. Now it is requested that they in general "teach" some subject. Beginning to appear are expectations that they meet "explicit behavioral criteria" such as enable first graders to type their names or seventh graders to achieve 90% on a given 50 item test in science. Going are the comfortable days when the educational media producer "knew" by intuition or technical standards that the product was right, or top quality, or the best.

In sum, the particular aspects of the present situation that seem most directly related to the training of future educational media producers are two:

1. Changing Technology

   Technology will continue to simplify many of the techniques of production so that many tasks can be taken over by the relatively unskilled and thus eliminate or reduce the need for many production skills. At the same time technology will continue to add new and complex media so rapidly that no one can become an expert in more than one or two. Consequently the trend toward single media tech-

nicians will continue, and as one medium changes or is replaced by another the previous technicians will have to be retrained or replaced by new. For the technician, then, the picture is one of change and perhaps continuous in-service training.

However, for the educational world the acute need will be for someone else -- a man who somehow has an encompassing knowledge of all media and the peculiar contributions of each to education. Who can fill this role and how will he be trained?

2. Criteria of Excellence

The other aspect of the present situation is that educational media producers for the most part are using outmoded or irrelevant models for professional accomplishment. The educational film maker's criterion of excellence is frequently Hollywood or the Film Festival Award; the educational TV director's criterion is directly or indirectly the rating, i.e., number of viewers; the educational photographer tries to copy his commercial counterpart; the educational graphics man gets his inspiration from the cigarette and bra ads, and the educational sound recordist aspires to outdo the hi-fi stereo bugs. What media producers today know about learning as a criterion or use it consistently in their decision making?

Future more vital role for the designer of educational media

It should be stated openly that what follows is no simple panacea and in fact may be grasping at straws. But let's examine the position as detachedly as possible and assess its merit.

Consideration of the questions raised in 1 and 2 seems to me to suggest the need for a type of man who has a dual specialization -- one in educational media (production and/or use) and one in educational research and theory (learning and/or communication). This man would be an Educational Media Specialist whose responsibilities might encompass the traditionally separate preparation and use areas or might include only one or the other. However, in the discussion and proposals which follow, the preparation or production role will be the center of attention, and the name Educational Media Designer will be applied to it. Conceive of the name as referring to a design function rather than to a design man, for as a function it can more flexibly become part of one man, all of a man, or divided among several men as the situation demands.

The Educational Media Designer would be a designer of educational media systems to fit schools of various sizes, curricula and objectives of various types, and learners of various ages and capabilities. He would be a professional in the prescription of pictorial and verbal constituents to meet specific needs of the teacher and learner in the furtherance of given educational objectives. The Educational Media Designer would not basically be a technician, though he must know the educational attributes and technical possibilities of each medium. He would not basically be a teacher, though he might well have been one and would certainly be thoroughly familiar with their objectives and methods. He would be like an engineer in knowing what type of structural member (pictorial and/or verbal element) can contribute to the whole building (learning environment) in a way that will meet the needs of the users (teachers and students, and ultimately, society). Actually the media producer of today is already a designer, but he must become a more effective one.

What is the significance of this role to AV and to education?

1. It will be an increasingly important and essential role as more educators become aware of the centrality of media to the process of learning and at the same time become overwhelmed by the complexity of the task of choosing and integrating the great diversity of media into efficient, effective, and cohesive units.

2. The role can encompass all media because technicians in particular media will implement the designer's plans in large school systems, or, given a simplified technology, the designer can in a small school execute much of his own design satisfactorily.

3. The role will have such a braod base that the designer would welcome all technological change rather than feel threatened by it, i.e., he would accept technological advances as an architect accepts new building materials.

4. Not being bound to a particular medium, as is the present producer, the future designer can choose more objectively the medium best suited for a specific educational objective.

5. Backed up by enough research (much more than now exists) and experience he will be able to reliably specify in each case which design would be most apt to effect the learner behavior desired by the curriculum specialist, i.e., he would have valid educational criteria and know how to meet them.

6. The designer will be intimately familiar with the whole encoding-decoding process whereby ideas are translated through successive steps into media, tested with the target audience, and refined as necessary. (A word of caution here -- I don't believe that in the foreseeable future educational media design will become so certain, pat, and formalized that a healthy amount of creative ability will be unnecessary. However, if established educational goals are to be met with any certainty something more tangible than an artistic flair will be required of the designer.)

To definitively specify a curriculum for shaping men for the above role would first require that a comprehensive set of objectives be drawn up that would denote in precise and detailed behavioral terms what the educational media designer must be able to do. However, knowing both the difficulty of such specification and the provisional framework within which this paper is being written and, I hope, received, it seems unwise to go that far at this time. Consensus on descriptively-stated goals and course content should precede their full delineation. Hence, the preceding description of the role will suffice for planning in gross outline a curriculum proposal describing one route to go in preparing for it.

Undergraduate preparations

The student entering the program should have a bachelors degree and before completing a Doctor's or Specialist program should have two or more years of work experience in the field.

Making lists of undergraduate courses judged to be necessary and desirable is relatively simple. Fitting them into the realities and strictures of present college and university requirements creates impossible problems. One solution would be just to list the courses and assert that 10 years from now requirements (currently undergoing a widespread reappraisal in liberal arts colleges) will be sufficiently permissive to include them. Still more speculative would be the suggestion that a number of undergraduate courses might be tailor-made for the purpose from a synthesis of the relevant

pieces of many existing courses. As a compromise, two traditional majors will be suggested along with a list of important course content.

Education seems to be the best compromise for the undergraduate major because it includes both the desireable professional education courses and a reasonable breadth of arts and sciences courses. The education courses that seem most important are those in psychology, methods, curriculum, measurement, and audio-visual. (Many of these could be made more meaningful to media persons and perhaps to teacher trainees as well.) Outside of education the course concentration could be in science, social studies, language arts, or mathematics.

Psychology seems to be another possible undergraduate major with a minor in education, if possible, or at least all electives in education. The greatest problem would be provision for a significant student teaching experience.

Important Undergraduate Content (to be included as possible in one of above majors)

1. Education - especially psychology, methods, measurement, curriculum, administration, and audio-visual (beginning preparation and utilization)

2. Psychology - especially perception, learning, motivation, development

3. Student teaching - providing a first hand encounter with the teaching-learning process

4. Communications

   Basic Skills

      Writing - creative, journalism, playwriting, scientific writing. (also linguistics and symbolic logic.)

      Drawing - freehand, mechanical. (also art history and aesthetics)

   Technologies - introduction to techniques

      Computers, photography, motion pictures, radio, television, etc.

   Theory and research

      Should be courses especially for Educational Media Specialists as an an introduction to graduate work. Should provide some models or frameworks within which much of the otherwise fragmented undergraduate experiences can be unified. (Fragments now appear in occasional courses in English, Journalism, Business, Sociology, Psychology, and Audio-Visual.)

5. Mathematics - enough to handle statistics, computer programing, and mathematical models for learning and communication.

6. Physics - particularly for a thorough working knowledge of electronics, but also for mechanics and optics.

7. Acting, Directing - in TV, theater, or film

8. Business Management, Accounting

A valid case could be made for sampling all major fields of learning. The importance of this would be that some awareness of the ways of gaining and assessing truth in each discipline as well as the structural relationship of ideas within and between disciplines is essential to the design of any eventual learning system to impart the basic concepts in each field. In point of fact, however, most college and university curricula already provide for a minimum and perhaps sufficient sampling across major discipline groupings.

The case for some undergraduate specialization (science, social studies, languages, or math) may be a stronger one because of theprobable demand by large city or state systems for media designers with sophistication in major school subject areas.

Particular importance is attached to the student teaching experience or something comparable in a college, church, or community service activity that puts the candidate in close and meaningful contact with the teaching aspect of the instructional process.

Masters Program - Operating level of competence

The Masters program being proposed would prepare the student to be a Media Designer at the school building level or at the small system level. As such he must be a very carefully weighted composite of communication process, technique, and theory. He will be dealing with relatively simple men-machine systems; relatively inexpensive and uncomplicated media; and relatively unsophisticated methods of obtaining feedback, evaluating it, and modifying the system.

This Masters program is a kind of core curriculum for all post graduates, but is terminal for Masters candidates and introductory for Doctors and Specialists.

3 hrs	Communication Theory - introduction
3	Pictorial Communication - theory and practice
3	Verbal Communication - theory and practice
6	Media Practice - familiarization with current educational tools for both production and utilization.
3	Design of Group Media - introductory principles and practice.
3	Programing of Self-instructional Media - introductory principles and practice
3	Media Utilization Systems - introductory principles and practice
3	Advanced Educational Psychology - learning, motivation, individual differences
3	Educational Measurement - operational educational objectives and their assessment
3	Administration of Media - personnel, budget, management
3	Group Processes and the Dynamics of Engineering Social Change
36	Hours Total

Specialists and Doctors Program -- Advanced levels of competence

The curriculum for these two roles builds on top of the Masters program. It consists essentially of advanced study in the areas introduced during the first year of graduate work. The differences between Specialist and Doctoral programs are few. The Specialist curriculum includes Advanced Media Practice while the Doctoral provides Advanced Research Methods. Also, and importantly, the Specialist includes an internship while the Doctors substitutes a thesis.

What is envisaged is two roles of equal stature but somewhat different primary emphasis, the Specialist being focused on the design, revision, and supervision of large

and complex media systems, and the Doctors on the conduct of research and the development of new educational media systems and theories. The requirements in many situations would be such as to favor neither man, while in others the situation might call for additional specialization favoring one or the other.

Specialist

6 hrs	Advanced Communication Theory
6	Advanced Media Design
6	Advanced Media Utilization Systems
6	Advanced Construction and Testing of Educational Objectives
6	Advanced Media Practice
15	Internship -- design, implementation, evaluation of man-machine system for teaching a specific school subject at a particular grade level
45	Total Hours

Doctors

24 hrs	Same Theory, Design, Systems, and Testing Courses as above
6	Advanced Research Methods
15	Thesis
45	Hours total

Looking back over the three programs I observe that though planned with the producer-designer in mind they might also, with minor modification, be suitable for the utilization person. Perhaps at the Masters and Doctors level there should be a unitary program while the Specialist level might provide for the production and utilization split.

The Training Program

Staff and Equipment. Instruction leading to the three advanced degrees should epitomize the design-for-learning principles that it espouses. Its system should demonstrate the optimum use of humans and machines as means to the accomplishment of clearly specified behavioral goals. However, this sophistication should not necessarily mean excessive investment in staff or equipment. This is particularly true of the Masters program which should be such that the equipment and staff investment would not be so great as to be a deterrent to its widespread development in colleges and universities across the nation. The seeming paucity of the full fruits of technology (3-D sound, wide screen motion pictures, and computer-based instructional systems) will be a deliberate lesson to the media student that learning criteria are not always met by higher powered machines. The machines for a Masters program will be comparable to that likely to be available to the school building or small system in which the graduate will find his place. In terms of today's technology it might include a packet of file cards for a teaching machine, a Polaroid camera for slides, etc., a Ozalid outfit for overhead pieces, and an 8mm camera for single concept films.

For the Specialist and Doctoral programs, however, the latest devices should be available regardless of cost, and so should the engineering capability for creating new devices. There should be ample opportunity for the media students to have first hand

experience in operating this equipment, but always within the framework of using it to further the progress of a learner toward known educational objectives. No media student should be allowed to become so enamored of or personally identified with one medium that it is favored in his design choices over others of more suitability for the purpose.

Throughout the training, experience in the techniques and processes of each media type is never isolated from design principles or behavioral outcomes. When a student designs and executes a programed slide and tape unit, for example, his peers and instructor may critique it, but this should not be allowed to outweigh the final criterion of success -- the behavior of learners experiencing his program.

Scope and Sequence. A detailed scope and sequence plan should be the product of extensive trial and revision, but some of its characteristics can be suggested and a representative unit sketched. My conviction is that the two seeming immiscibles, theory and practice, should be intimately blended in the sequence of training steps. The image of an ascending spiral best suggests the structure of the curriculum. One round of it might begin with an aspect of theory or a design principle, explore pictorial and verbal techniques relative to it, design a simple message incorporating it, use the message with a few individuals or classes, obtain and assess feedback. This circuit could be repeated at increasingly sophisticated levels of production technique, communication theory, message structure, and learner response. The initial medium should be as simple and flexible as a feltboard, thus permitting the student direct encounter with the basic problems of cue selection and cue arrangement. Manipulations within this medium should be wide ranging and might include concreteness-to-abstractness variables; size and color of elements; proximity of elements; use of arrows, circles, and other conventions; shading and texture; figure-ground relationships; emphatic devices, aesthetic relationships, etc. Various audio elements could begin to be introduced via simple tape recording in conjunction with the feltboard visual elements. This would introduce the student to the basic theoretical and practical issues involved -- influence of verbal cueing on pictorial perception, consonant and dissonant relationships between the aural and visual modes, channel capacities via each mode, the principle of contiguity in learning, etc. Beginning photography and copy lighting could be introduced as a means of recording feltboard pictures. Then a series of feltboard images could be designed and photographed. This might be the time to introduce the design principles involved in relating successive pictorial units -- how much similarity to retain and how much difference to introduce without stretching the perceivers ability to organize the elements as part of a common structure, how large a step to take between pictures, how to direct and maintain attention frame-by-frame, etc. Media of motion could be introduced at this time by simple animation techniques involving moving and single framing of feltboard figures. Psychological experiments with Phi-phenomena could be introduced here in relation to the illusion of motion in motion pictures. From the arrangement and manipulation of cutout figures on a feltboard to the direction of people within the frame of a still or motion camera may seem a large jump, but might be a next step when judged independently of the lines of union jurisdiction it crosses and when seen as a next higher spiral in learning. At any rate, the above is only one of many possible ways of programing a spiral sequence of theoretical and applied activities in a curriculum. The important thing is that an intimate knowledge of learner behavior, i.e., what he perceives and how he responds, develops in conuunction with first hand knowledge of communicator behavior, i.e., the techniques of designing and presenting a message.

Miscellaneous concluding thoughts

First, it should be clear to the reader, as it is to the writer, that this paper is strongly slanted toward the preparation of Educational Media Designers for a career in formal education to the exclusion of other fields currently clamoring for such specialists and probable others that will be. In a way the proposed curriculum already suffers from the attempt to include too much content diversity, and even suggests specialization in so many fields as to in essence produce a generalist. Without wanting to continue this tendancy I would suggest that the cirriculum could readily be adapted to fit media designers for careers in industry, for example, by an internship or thesis in that area as well as the substitution of such courses as business communication, management, finance, etc., for comparable graduate and undergraduate work. Similar substitutions could also be made for those students preparing for media design work in Medicine, Government, International Relation, etc. Criteria for such substitutions should be that media designers must be as knowledgeable as possible in the subject to be communicated, the situations in which the communication takes place, and the particular audiences to be reached by the communication. Except for the strictures imposed by these factors the media student's preparation in educational theory, process, and technique could be the same regardless of the particular field in which he is to apply his talent.

Second, the cycle of design-test-redesign has perhaps been labored unduly in the paper, but would, I believe, characterize both training and practice particularly at the outset. Eventually, as research and experience accumulated, the initial designs would be more nearly correct and the redesign phase less extensive, perhaps. Also, as educational system designs came to be perfected there would be the possibility that the design function would give way to a kind of monitoring and occasional modification. However, if the present dynamic situation in education continues and if mans knowledge continues to increase at the same accelerated rate, it would be time to begin a new K through 12 design as soon as the previous one had been finished.